

5 **Claims**

1. A breakaway coupler for coupling an upstream hose with a downstream hose for passing fluid therebetween when coupled and closing flow when uncoupled, the breakaway coupler comprising:

an upstream housing securable to the upstream hose;

10 an upstream coupling member secured to the upstream housing and having a flow passage for fluid communication with the upstream hose;

a downstream housing securable to the downstream hose;

a downstream coupling member secured to the downstream housing and having a flow passage for fluid communication with the downstream hose;

15 a locking member carried by one of the upstream and downstream coupling members for selectively locking with the other of the upstream and downstream coupling member;

an upstream flapper pivotally secured with respect to the upstream housing and movable between an open and closed position to open and close flow through
20 the upstream coupling member, the upstream flapper having a first engagement surface and a second engagement surface angled with respect to the first engagement surface, the first and second engagement surfaces radially spaced from a flapper axis of rotation; and

a pushrod axially movable with respect to the upstream housing in response
25 to axial movement of the coupling members, the pushrod having an end surface engageable with the first engagement surface for moving the upstream flapper to the open position and engageable with the second engagement surface to retain the upstream flapper in the open position, such that locking the upstream and downstream coupling members opens the upstream flapper and unlocking the
30 upstream and downstream coupling members allows the upstream flapper to close.

2. A breakaway coupler as defined in Claim 1, further comprising:

a receiving member defined by the other of the upstream and downstream

5 coupling members, the locking member radially movable into and out of the receiving member to respectively lock and unlock the upstream and downstream coupling members.

3. A breakaway coupler as defined in Claim 2, further comprising:
10 the locking member being carried by the downstream coupling member and the receiving member being carried by the upstream coupling member, the locking member movable radially into the receiving member to lock the upstream and downstream coupling members.

15 4. A breakaway coupler as defined in Claim 3, further comprising:
the locking member including one or more locking balls and the receiving member including one or more outwardly facing locking recesses.

5. A breakaway coupler as defined in Claim 3, further comprising:
20 a trigger member radially outward of the locking member and having one or more inwardly facing unlocking recesses into which the locking member is movable to unlock the upstream and downstream coupling members; and
a trigger spring axially biasing the downstream housing from the trigger member to position the locking member at least partially downstream from the one
25 or more inwardly facing unlocking recesses to maintain locking of the upstream and downstream coupling members.

6. A breakaway coupler as defined in Claim 5, further comprising:
an outwardly facing pry recess on the downstream coupling member, such
30 that a tool inserted into the pry recess is leverageable against the trigger member to move the downstream coupling member.

7. A breakaway coupler as defined in Claim 5, wherein the locking

5 member includes one or more locking balls, and the trigger spring biases the downstream housing to position the one or more locking balls no more than one ball diameter downstream from the inwardly facing unlocking recesses.

8. A breakaway coupler as defined in Claim 1, further comprising:
10 the downstream coupling member engaging the pushrod to move the upstream flapper to the open position.

9. A breakaway coupler as defined in Claim 1, further comprising:
a flapper biasing spring for biasing the upstream flapper toward the closed
15 position.

10. A breakaway coupler as defined in Claim 1, further comprising:
a downstream flapper pivotally secured with respect to the downstream housing and movable between an open and closed position to open and close flow
20 through the downstream coupling member.

11. A breakaway coupler as defined in Claim 1, wherein the first and the second engagement surface of the upstream flapper intersect at an edge.

25 12. A breakaway coupler as defined in Claim 1, wherein the second engagement surface is angled at approximately 90 degrees to the first engagement surface.

13. A breakaway coupler as defined in Claim 1, further comprising:
30 a pushrod biasing spring for biasing the pushrod away from the second engagement surface; and
the pushrod is sealed to the upstream housing.

5 14. A breakaway coupler for coupling an upstream hose with a
downstream hose for passing fluid therebetween when coupled and closing flow
when uncoupled, the breakaway coupler comprising:
 an upstream housing securable to the upstream hose;
 an upstream coupling member secured to the upstream housing and having a
10 flow passage for fluid communication with the upstream hose;
 a downstream housing securable to the downstream hose;
 a downstream coupling member secured to the downstream housing and
having a flow passage for fluid communication with the downstream hose;
 one or more locking balls carried by the downstream coupling member;
15 one or more outwardly facing locking recesses on the upstream coupling
member, the one or more locking balls movable radially inward into the one or more
outwardly facing locking recesses to lock the upstream and downstream coupling
members;
 a trigger member radially outward of the one or more locking balls and having
20 one or more inwardly facing unlocking recesses;
 a trigger spring axially biasing the downstream housing from the trigger
member to position the locking member at least partially downstream from the one
or more inwardly facing unlocking recesses, to maintain locking of the upstream and
downstream coupling members;
25 an upstream flapper pivotally secured with respect to the upstream housing
and movable between an open and closed position to open and close flow through
the upstream coupling member, the upstream flapper having a first engagement
surface and a second engagement surface angled with respect to the first
engagement surface; and
30 a pushrod axially movable in response to engagement by the downstream
coupling member, the pushrod having an end surface engageable with the first
engagement surface for moving the upstream flapper to the open position and
engageable with the second engagement surface to retain the upstream flapper in

5 the open position, such that locking the upstream and downstream coupling
members opens the upstream flapper and unlocking the upstream and downstream
coupling members allows the upstream flapper to close.

10 15. A breakaway coupler as defined in Claim 14, wherein the trigger spring
biases the downstream housing to position the one or more locking balls no more
than one ball diameter downstream from the one or more inwardly facing unlocking
recesses.

15 16. A breakaway coupler as defined in Claim 14, further comprising:
an outwardly facing pry recess on the downstream coupling member, such
that a tool inserted into the pry recess is leverageable against the trigger member to
move the downstream coupling member.

20 17. A breakaway coupler as defined in Claim 14, further comprising:
a downstream flapper pivotally secured with respect to the downstream
housing and movable between an open and closed position to open and close flow
through the downstream coupling member.

25 18. A breakaway coupler for coupling an upstream hose with a
downstream hose for passing fluid therebetween when coupled and closing flow
when uncoupled, the breakaway coupler comprising:
an upstream housing securable to the upstream hose;
an upstream coupling member secured to the upstream housing and having a
flow passage for fluid communication with the upstream hose;
30 a downstream housing securable to the downstream hose;
a downstream coupling member secured to the downstream housing and
having a flow passage for fluid communication with the downstream hose;
a locking member carried by one of the upstream and downstream coupling

5 members and a receiving member defined by the other of the upstream and downstream coupling members, the locking member radially movable into and out of the receiving member to respectively lock and unlock the upstream and downstream coupling members;

10 a trigger member radially outward of the locking member and having one or more inwardly facing unlocking recesses into which the locking member is movable to unlock the upstream and downstream coupling members;

a trigger spring axially biasing the one of the upstream and downstream coupling members on which the locking member is carried; and

15 an outwardly facing pry recess on the one of the upstream and downstream coupling members on which the locking member is carried, such that a tool inserted into the pry recess is leverageable to move the locking member toward the one or more unlocking recesses.

19. A breakaway coupler as defined in Claim 18, further comprising:
20 the locking member being carried by the downstream coupling member and the receiving member being carried by the upstream coupling member, the locking member movable radially into the receiving member to lock the upstream and downstream coupling members.

25 20. A breakaway coupler as defined in Claim 19, further comprising:
the locking member including one or more locking balls and the receiving member including one or more outwardly facing locking recesses.

- 5 21. A breakaway coupler as defined in Claim 20, wherein the trigger spring axially biases the locking member to position the one or more locking balls no more than one ball diameter away from the inwardly facing unlocking recesses.